

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

HIRANO et al.

Art Unit:

Divisional of Application No.: 09/056,604

Examiner:

Filed: HEREWITH

Attorney Dkt. No.: 107318-00000

For: SEMICONDUCTOR DEVICE DISPLAY DEVICE AND METHOD OF
FABRICATING THE SAME

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Date: March 22, 2001

Sir:

This application is a Divisional application under 37 C.F.R. § 1.53(b) of
application Serial Number 09/056,604, filed April 8, 1998.

Prior to calculation of the Filing Fee and examination of the above-identified U.S.
patent application, please amend the above-identified application as follows:

IN THE SPECIFICATION:

Please amend the specification as follows:

Page 1, before line 1, insert -- This application is a Divisional application of U.S.
Serial No. 09/056,604, filed April 8, 1998, which is a divisional application of U.S. Serial
No. 08/677,742 filed July 2, 1996 now U.S. Patent No. 5,771,110. --

Page 3, line 6, after "film" insert --55--‘

Page 26, line 21, delte "6b" and insert therefore --4b--.

IN THE CLAIMS:

Please cancel claims 1-43 without prejudice or disclaimer.

Please add the following new claims:

44. A method of fabricating a semiconductor device, comprising the steps of:
 forming an amorphous silicon film on an insulating substrate;
 heat treating said amorphous silicon film by laser annealing, therein
 forming a polychrystalline silicon film;
 forming an impurity region in said polycrystalline silicon film; and
 rapidly heat treating said impurity region by rapid thermal annealing,
 therein activating said impurity region.

45. A method of fabricating a semiconductor device, comprising the steps of:
 forming an amorphous silicon film on an insulating substrate;
 heat treating said amorphous silicon film by laser annealing, therein
 forming a polycrystalline silicon film;
 forming an impurity region in said polycrystalline silicon film; and
 rapidly heat treating said impurity region by employing a lamp as a heat
 source, therein activating said impurity region.

46. The method of fabricating a semiconductor device in accordance with
 claim 44, further comprising a step of forming a gate electrode on said polycrystalline
 silicon film before the step of forming said impurity region in said polycrystalline silicon
 film.

✓ 47. The method of fabricating a semiconductor device in accordance with claim 46, wherein said gate electrode comprises an amorphous silicon film[, and the amorphous silicon film] which is crystallized by heat treatment for activation of said impurity region.

48. The method of fabricating a semiconductor device in accordance with claim 46, wherein said gate electrode comprises a layered structure of a silicon film and one of a metal and metal silicide film and resistance of said gate electrode is reduced by said heat treatment for activation of said impurity region.

49. The method of fabricating a semiconductor device in accordance with claim 44, wherein said amorphous silicon film contains microcrystals.

50. The method of fabricating a semiconductor device in accordance with claim 46, wherein said gate electrode has a layered structure of a silicon film and one of a metal and metal silicide film, and reduction of resistance of said gate electrode and activation of said impurity region are simultaneously performed by one of rapid thermal annealing and laser annealing.

51. The method of fabricating a semiconductor device in accordance with claim 44, wherein light irradiation heat from a lamp is employed as a heat source for said rapid thermal annealing.

52. The method of fabricating a semiconductor device in accordance with claim 45, wherein a xenon arc lamp is employed as said lamp.

53. A method of fabricating a thin film transistor, comprising the steps of:
forming an amorphous silicon film on an insulating substrate;
heat treating said amorphous silicon film by laser annealing, therein forming a polycrystalline silicon film;
forming an impurity region in said polycrystalline silicon film; and
rapidly heat treating said impurity region by rapid thermal annealing,
therein activating said impurity region.

54. A method of fabricating a thin film transistor comprising the steps of:
forming an amorphous silicon film on an insulating substrate;
heat treating said amorphous silicon film by laser annealing, therein forming a polycrystalline silicon film;
forming an impurity region in said polycrystalline silicon film; and
rapidly heat treating said impurity region by employing a lamp as a heat source, therein activating said impurity region.

55. The method of fabricating a thin film transistor in accordance with claim 44, wherein heating by said rapid thermal annealing is performed a plurality of times while the heating temperature is increased stepwise from an initial time to a final time.

56. A method of fabricating a semiconductor device, comprising the steps of:
forming a semiconductor film on a substrate;
forming an impurity region in said semiconductor film; and
activating said impurity region by a heat treatment through rapid thermal annealing;

wherein heating by said rapid thermal annealing being performed a plurality of times, the heating temperature being increased stepwise from an initial time to a final time.

57. A method of fabricating a semiconductor device in accordance with claim 56, wherein a highest heating temperature in said stepwise increasing in temperature through rapid thermal annealing is a temperature not deforming said substrate.

58. A method of fabricating a semiconductor device, comprising the steps of:
forming a semiconductor film on a substrate;
forming a gate electrode [on] of said semiconductor device [through] on a gate insulating film;

forming an impurity region in said semiconductor film; and
activating said impurity region by a heat treatment through rapid thermal annealing,

wherein heating by said rapid thermal annealing being performed a plurality of times, the heating temperature being increased stepwise from an initial time to a final time.

59. The method of fabricating a semiconductor device in accordance with 44, wherein said laser annealing is performed by applying a laser beam in the form of sheet.

REMARKS

Claims 44-59 are pending in this application. The claims represent claims 45, 46, 48-56, 60 and 73-76 which were cancelled in the parent application. No new matter is contained in the amendments.

Please charge any fee deficiency or credit any overpayment to Deposit Account No. 01-2300.

Respectfully submitted,



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